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10/500,562	01/10/2005	Toshio Kamei	G0126.0231	5194

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DICKSTEIN SHAPIRO LLP
1177 AVENUE OF THE AMERICAS (6TH AVENUE)
NEW YORK, NY 10036-2714

EXAMINER	
YEH, EUENG NAN	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/500,562	KAMEI, TOSHIO	
	Examiner	Art Unit	
	EUENG-NAN YEH	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 April 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) *8 and 16* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9-15, 17,18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

FINAL ACTION

Response to Amendment

1. The following Office Action is responsive to the amendment and remarks received on April 8, 2009. Original claims 8 and 16 were cancelled. Claims 1-7, 9-15, 17, and 18 remain pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 2, 5-7, 9, 10, 13-15, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Center, JR. (US 2003/0059124 A1), Philomin et al. (US 2003/0113002 A1), and Kroeker et al. (US 5,369,726).

Regarding claims 1 (method), 9 (system), and 17 (CRM), Center discloses a metadata generation system comprising:

- clipping a plurality of different local areas of said image by an area clipping section of the face metadata generating unit (as depicted in figure 1, the combination of numerals 28, 30, 34, and 36 is the face metadata generating unit wherein the numerals 28 and 30 are the area clipping section to find plurality of different local areas of said

image such as head and eye for #28 and #30, respectively. As shown in figure 1, numeral 22 is the image input unit. Furthermore, "[t]he image acquisition stage 22 may, alternatively, be an interface to a storage device, such as a magnetic storage medium ..." in paragraph 38, line 12. Thus, numeral 22 can also be used to represent a storage unit);

- extracting frequency features for the respective local areas by a frequency feature extracting section of the face metadata generating unit ("The invention advantageously uses a transformation into the frequency domain to more efficiently correlate the acquired image with the set of stored images" in paragraph 9, line 4. See also figure 9, numeral 330, "[t]he system then normalizes the unknown facial image, as set forth in step 330 ... and converts the normalized image data into the frequency domain using DFFT 210B. The system then defines a windowing function of the type described above (e.g., center-weighted function) to emphasize selected local features or portions of the image. This is set forth in step 335. The system then overlays the image on the windowing function, and calculates a set of component coefficients Ω for the unknown image in terms of the eigenfaces μ_k using a dot product operation, step 340" in paragraph 99, line 1. Thus, Center discloses the frequency features extraction steps by processing an image in frequency domain by DFFT (Discrete Fast Fourier Transform), then to emphasize selected local features, and then calculate components in terms of eigenfaces μ_k. Therefore, the frequency feature extracting section can be the combination of numerals 28, 30, and 34 of figure 1);

- projecting feature vectors, which are vectors consisting of said frequency features, onto predefined subspaces by a vector projecting section of the face metadata generating unit; thereby extracting the projected feature vectors of the respective local areas so as to generate the projected feature vectors as face metadata (as depicted in figure 1, wherein numeral 36 is the vector projection section, "... compression stage 36, which can be a principal component analysis compression stage. This stage produces eigenvectors from a reference set of images projected into a multi-dimensional image space. The vectors are then used to characterize the acquired image ..." in paragraph 36, line 12. See also, "[t]he actual encoding or compression process can employ a Karhunen-Loeve transformation or an eigenvector projection technique, which encodes an image of a person's face or other facial feature, such as nose, eyes, lips, and so forth, as a weighted set of eigenvectors ... an image of a face is projected onto a face space defined by a set of reference eigenvectors. The reference set of eigenvectors, or eigenfaces, can be thought of as a set of features which together characterize the variation between face images within a reference set of facial images. This distribution of faces in the reference set of faces can be characterized by using principal component analysis to extract face information that characterizes the variations or differences between a newly acquired image (the projected image) and the eigenfaces ... Once the eigenfaces are identified an image signal can be represented as a function of these eigenfaces by projecting the image signal into the space defined by these eigenfaces" in paragraph 110, line 8).

Center does not explicitly disclose the local areas at regular intervals and the usage of orthonormal basis matrix. Furthermore, Center does not disclose the division of the basis matrix with the square root of a corresponding eigenvalue.

Philomin, in the field of endeavor of eigen feature study ("relates generally to person recognition" in paragraph 2, line 1), teaches the usefulness of eigenspace "... eigenface vectors can be used for identifying a person from a video image. In a similar manner, any method or system that generates eigenvoice vectors can be used for identifying or verifying the identity of a person from audio information. In the present invention, the face feature data and voice feature data for any one person are concatenated to form a composite eigenvector, and this composite eigenvector is used for person identification and/or person verification" in paragraph 21, line 2. "Various video and audio features can be used to obtain data for eigenface and eigenvoice vectors ... For example, the block average of these values can be computed in blocks of the image with predetermined sizes to have robustness to changing conditions, or these values can be used as they are pixel by pixel ..." in paragraph 22, line 1. As depicted in figure 2, incorporated by Philomin by reference, "step 304, a rectangular "window" region of each scaled input image (e.g., 20 x 30 pixels) is defined, ordinarily at a corner of the image. The pixels within the window are represented as vectors of points in image space and projected onto the principal subspace and the orthogonal subspace to obtain a probability estimate in step 306 ... the window is "moved" by defining a new region (step 310) of the same window size but displaced a distance of one pixel from the already-analyzed window ..." in paragraph 28, line 1. Thus, Philomin discloses:

a) a plurality of local areas is set at regular intervals with the same window size but displaced at a distance of one pixel from the already-analyzed window;

b) frequency features are projected onto the principal subspace and the orthogonal subspace.

It would have been obvious at the time the invention was made, that one of ordinary skill in the art would have been motivated to include the metadata generation system Center made, with blocks of image "with predetermined sizes to have robustness to changing conditions" in Philomin paragraph 22, line 11.

The Center and Philomin combination does not explicitly teach the division of the basis matrix with the square root of a corresponding eigenvalue.

Kroeker, in the field of endeavor of pattern recognition ("in recognizing patterns in data-reduced versions of the speech" at column 1, line 16), teaches non-linear processor to extract features through eigenspace as shown in figures 20 and 21, "FIG. 20 defines a covariance matrix R 410 which is used in calculating various eigenmatrices ... The covariance matrix R is then used to calculate eigenvectors and associated eigenvalues as shown in FIG. 21" at column 19, line 31. "Referring to FIG. 21, the eigenvalues are calculated in block 412 and ordered, with vector b_0 (from 414) being the eigenvector having the largest eigenvalue and b_{A-1} being the eigenvector having the smallest eigenvalue. The eigenvectors are then normalized by dividing each one by the square root of the corresponding eigenvalue to produce a vector b'_n 420 . The first B normalized eigenvectors, that is, the B normalized eigenvectors corresponding to the B largest eigenvalues, are assembled into eigenmatrix E_B424 ..." at column 19, line 38.

It would have been obvious at the time the invention was made, that one of ordinary skill in the art would have been motivated to include the metadata generation system of the Center and Philomin combination, with the square root of eigenvalue as normalizer as taught by Kroeker, such that "by selecting the information corresponding to the largest eigenvectors we are selecting the information which is most important for phoneme recognition after further processing" at Kroeker column 13 line 18.

Regarding claims 2 and 10, power spectral intensities of Fourier frequencies obtained by discrete Fourier transform are extracted as said frequency features (discussed in claim 1, the Discrete Fast Fourier Transform (DFFT) used for the analysis. Thus, the amplitudes of the DFFT coefficients, i.e. the power spectral intensities of DFFT, can be extracted as frequency features).

Regarding claims 5 and 13, said subspaces are specified by basis vectors previously obtained by principal component analysis for frequency features, and frequency feature vectors are projected onto the specified subspaces to calculate principal component vectors (discussed in claim 1, the principal component analysis (PCA) used for the subspace data processing).

Regarding claims 6-7 and 14-15 ("... eigenface vectors can be used for identifying a person from a video image. In a similar manner, any method or system that generates eigenvoice vectors can be used for identifying or verifying the identity of a

person from audio information. In the present invention, the face feature data and voice feature data for any one person are concatenated to form a composite eigenvector, and this composite eigenvector is used for person identification and/or person verification" in Philomin paragraph 21, line 2. The dimension of voice supervector can be reduced "by any linear transformation that reduces the original high-dimensional supervectors into voice basis vectors. A non-exhaustive list of examples of linear transformation includes: Principal Component Analysis (PCA), Independent Component Analysis (ICA), Linear Discriminant Analysis (LDA), Factor Analysis (FA), and Singular Value Decomposition (SVD)" in paragraph 34, line 12. Furthermore, "Dimensionality reduction yields one voice eigenvector for each one of the training speakers ... The voice eigenvectors that make up the eigenvoice space each represent a different dimension across which different speakers may be differentiated" in Philomin paragraph 35, line 2. Without departing from the scope and spirit of Philomin's methodology, linear transformation such as PCA, ICA, and LDA can be applied to eigenface analysis).

Regarding claim 18, the Center, Philomin, and Kroeker combination discloses a metadata generation system comprising:

- a face image input unit for inputting a face image (as depicted in Center figure 1, numeral 22);

- a face metadata generating unit for generating face metadata from an inputted face image (as depicted in Center figure 2, detection stage #50 and PCA #36);

- a face metadata storage unit for storing generated face metadata therein, a face similarity calculating unit for calculating a similarity of a face from said face metadata, a face image database for storing said face images (as depicted in Center figure 1, numeral 34 "The image manipulation stage 34 places the image in suitable condition for compression and subsequent comparison with pre-stored image identification information" in paragraph 36, line 9);

- a controller for controlling, in response to a registration request and a retrieval request of the image, input of the image, generation of the metadata, storing of the metadata, and calculation of face similarity (as depicted in Center figure 1, numerals 26 and 34 "the frame grabber 26 is conventionally configured to capture and digitize image frames" in paragraph 39, line 7. See also "frame grabber 26 produces a digitized frame output signal 44 which is operatively communicated with multiple locations ..." in paragraph 40, line 1. "The image manipulation stage 34 places the image in suitable condition for compression and subsequent comparison with pre-stored image identification information" in paragraph 36, line 9);

- a display unit (as depicted in Philomin figure 1, numeral 184, wherein this figure is incorporated by Philomin by reference); wherein said face metadata generating unit comprises:

- area clipping means for clipping local areas of said face image, the local areas having, as centers, points previously set at regular intervals (as discussed in claims 1 and 9 for the data clipping processing);

- frequency feature extracting means for extracting frequency features for the areas clipped by said area clipping means (as depicted in Center figure 1, numeral 34 and figure 9, numeral 330. Reference to claim 1 for extracting frequency);

- vector projection means for projecting feature vectors, which are vectors consisting of the frequency features extracted by said frequency feature extracting means, onto predefined subspaces using an orthonormal basis matrix(as depicted in Center figure 1, numeral 36, "compression stage 36, which can be a principal component analysis compression stage. This stage produces eigenvectors from a reference set of images projected into a multi-dimensional image space. The vectors are then used to characterize the acquired image. The compression stage 36 in turn generates an output signal which serves as an input to a discrimination stage 38, which determines whether the acquired image matches a pre-stored image" in paragraph 36, line 13. See also the claim 1 discussion at for the projecting feature vectors about the orthonormal basis matrix);

said face metadata generating unit extracts the projected feature vectors of a plurality of different local areas so as to generate the projected feature vectors as face metadata, said subspaces being predefined by basis vectors obtained by previously dividing a components of each basis vector in the basis matrix by the square root of a corresponding eigenvalue (as depicted in Center figure 2, PCA stage #36 "… This stage produces eigenvectors from a reference set of images projected into a multi-dimensional image space. The vectors are then used to characterize the acquired

image ..." in paragraph 36, line 15. Also, reference to claim 1 for the discussion of orthonormal basis matrix and the square root of corresponding eigenvalue),

4. Claims 3-4 and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Center, Philomin, and Kroeker as applied to claims 1, and 9, and further in view of Satonaka et al. (US 6,236,749 B1).

Regarding claims 3-4 and 11-12, the Center, Philomin, and Kroeker combination discloses a metadata generation system with DFFT for the frequency features as discussed in claims 1 and 9. The Center, Philomin, and Kroeker combination does not explicitly disclose DCT or DST frequency features.

Satonaka, in the field of endeavor of feature extraction ("recognizing an object in a three-dimensional space based on the feature patterns of a two-dimensional image" at column 1, line 5), teaches the feature pattern transformation "by using a two-dimensional discrete cosine transform or a two-dimensional discrete sine transform, thereby obtaining frequency components in a two-dimensional space" at column 3, line 25.

It would have been obvious at the time the invention was made, that one of ordinary skill in the art would have been motivated to include the metadata generation system of the Center, Philomin, and Kroeker combination, with DCT/DST capability as taught by Satonaka, such that various frequency components can be extracted and "... a number of the components maximizes recognition precision" at column 3, line 34.

Response to Arguments

a) Summary of Applicant's Remark:

"Amended independent claim 1 recites, inter alia, a step of clipping a plurality of different local areas of the image by an area clipping section of the face metadata generating unit, the plurality of different local areas having, as centers, points previously set at regular intervals" at response page 7, line 16.

Examiner's Response:

Applicant's argument is moot in view of the new grounds of rejection advanced herein above. Specifically, the Philomin et al. (US 2003/0113002 A1) reference now teaches the concept of plurality of blocks at regular intervals of an image. Refer to the rejections above for further discussion.

b) Summary of Applicant's Remark:

"the features use, as inputs, values (intensity values) at points in an image space but do not use frequency features in the above-mentioned Fourier transformation. Applicant has found no teaching or suggestion of the abovementioned feature of amended claim 1 in Center, Jr." at response page 8, line 6.

Examiner's Response:

Center, Jr. discloses the frequency features extraction steps by processing an image in frequency domain by DFFT (Discrete Fast Fourier Transform), then to emphasize selected local features, and then calculate components in terms of

eigenfaces μ_k. Thus, frequency features are extracted from Fourier transformed frequency space. Refer to the rejections above for further discussion.

c) Summary of Applicant's Remark:

The previous USC § 101 claim rejections should be withdrawn in view of the amendment.

Examiner's Response:

Examiner agrees, and the previous USC § 101 claim rejections are withdrawn.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Moghaddam et al. (US 5,710,833): human faces/hands eigenspace analysis.

6. Applicant's amendment is rejected in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eueng-nan Yeh whose telephone number is 571-270-1586. The examiner can normally be reached on Monday-Friday 8AM-4:30PM EDT.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 571-272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Bhavesh M Mehta/
Supervisory Patent Examiner, Art Unit 2624

Eueng-nan Yeh
Assistant Patent Examiner
Art Unit: 2624

/E.Y./